IRC CHAPTER 11 ENERGY EFFICIENCY
(2004 Supplement with 2006 Committee and Assembly Action)

SECTION N1101
GENERAL

N1101.1 Scope. This chapter regulates the energy efficiency for the design and construction of buildings regulated by this code.

Exception: Portions of the building envelope that do not enclose conditioned space.

WSEC Ref	Differences
101.3	Substantially the same
Description of Differences	
WSEC has additional information including: Exempt buildings, additions, remodels, historic buildings, change of occupancy and use, alterations and repairs	
SubTAG Recommendation	
Keep IRC, add new language	
Consensus?	
Amend with additional WSEC language	

N1101.2 Compliance. Compliance shall be demonstrated by either meeting the requirements of the *International Energy Conservation Code* or meeting the requirements of this chapter. Climate zones from Figure N1101.2 or Table N1101.2 shall be used in determining the applicable requirements from this chapter.

WSEC Ref	Differences
101.2	Substantially the same
Description of Differences	
The user may select either IECC or IRC. WSEC has extensive language regarding the three paths of compliance. An individual will have to read through IECC Chapter 4 to determine the compliance alternatives allowed. This section does not clearly state that there are three paths of compliance: Prescriptive, Component Performance, and Systems Analysis	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	
Substitute WSEC language via amendment	

N1101.2.1 Warm humid counties. Warm humid counties are listed in Table N1101.2.1.

WSEC Ref	Differences
None	IECC only
Description of Differences	
Washington does not have any warm, humid counties	
SubTAG Recommendation	
Delete via amendment	
Consensus?	
Keep IRC language	

TABLE N1101.2
CLIMATE ZONES BY STATES AND COUNTIES

Washington
Zone 4 Marine except
Zone 5 Dry
Adams, Asotin, Benton, Chelan, Columbia, Douglas, Franklin, Garfield, Grant, Kittitas, Klickitat, Lincoln, San Juan, Skamania, Spokane, Walla Walla, Whitman, Yakima
Zone 6 Dry
Ferry, Okanogan, Pend Oreille, Stevens

WSEC Ref	Differences
302.3	Substantially the same
Description of Differences	
IECC has three climate zones. WSEC has two	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1101.3 Identification. Materials, systems and equipment shall be identified in a manner that will allow a determination of compliance with the applicable provisions of this chapter.

WSEC Ref	Differences
102.1	Substantially the same
Description of Differences	
WSEC also requires that required equipment maintenance information be included on a label or in a publication.	
SubTAG Recommendation	
New language	
Consensus?	
Amend with WSEC language	

N1101.4 Building thermal envelope insulation. An *R*-value identification mark shall be applied by the manufacturer to each piece of building thermal envelope insulation 12 inches (305 mm) or greater in width. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and R-value of insulation installed in each element of the building thermal envelope. For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled R-value, installed density, coverage area and number of bags installed shall be listed on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the area covered and R-value of installed thickness shall be listed on the certification. [1]The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

WSEC Ref	Differences
502.1.4.1	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1101.4.1 Blown or sprayed roof/ceiling insulation. The thickness of blown in or sprayed roof/ceiling insulation shall be written in inches (mm) on markers that are installed at least one for every 300 square foot (28 m2) throughout the attic space. The markers shall be affixed to the trusses or joists and marked with the minimum initial installed thickness with numbers a minimum of 1 inch (25 mm) in height. Each marker shall face the attic access opening.

WSEC Ref	Differences
502.1.4.1	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1101.4.2 Insulation mark installation. Insulating materials shall be installed such that the manufacturer's R-value mark is readily observable upon inspection.

WSEC Ref	Differences
502.1.4.1	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1101.5 Fenestration product rating. *U-factors* of fenestration products (windows, doors and skylights) shall be determined in accordance with NFRC 100 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled U-*factor* shall be assigned a default *U-factor* from Tables N1101.5 (1) and N1101.5 (2). The solar heat gain coefficient (SHGC) of glazed fenestration products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled SHGC shall be assigned a default SHGC from Table 1101.5(3).

WSEC Ref	Differences
502.1.5.1	Different but can be easily changed
Description of Differences	
Does not contain the small business exception	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	
Substitute WSEC language via amendment	

TABLE N1101.5 (1)
DEFAULT GLAZED FENESTRATION U-FACTORS

Frame Type	Single Pane	Double Pane	Skylight	
			Single	Double
Metal	1.20	0.80	2.00	1.3
Metal with Thermal Break	1.10	0.65	1.90	1.1
Nonmetal or Metal Clad	0.95	0.55	1.75	1.05
Glazed Block	0.60			

[1] EC1

WSEC Ref	Differences
Table 10-6A, 10-6B, 10-6E	Different but can be easily changed
Description of Differences	
WSEC includes many variations depending on number of panes, air space and filler	
SubTAG Recommendation	
WSEC default tables be substituted.	
Consensus?	
Substitute WSEC language via amendment	

TABLE 10-6A
GROUP R OCCUPANCY:
DEFAULT U-FACTORS FOR VERTICAL GLAZING

Description[1,2,3,4]			Frame Type[5,6]		
			Aluminum	Aluminum Thermal Break[7]	Wood / Vinyl
Windows	Single		1.20	1.20	1.20
	Double, < 1/2"	Clear	0.92	0.75	0.63
		Clear + Argon	0.87	0.71	0.60
		Low-e	0.85	0.69	0.58
		Low-e + Argon	0.79	0.62	0.53
	Double, ≥ 1/2"	Clear	0.86	0.69	0.58
		Clear + Argon	0.83	0.67	0.55
		Low-e	0.78	0.61	0.51
		Low-e + Argon	0.75	0.58	0.48
	Triple,	Clear	0.70	0.53	0.43
		Clear + Argon	0.69	0.52	0.41
		Low-e	0.67	0.49	0.40
		Low-e + Argon	0.63	0.47	0.37
Garden Windows	Single		2.60	n.a.	2.31
	Double	Clear	1.81	n.a.	1.61
		Clear + Argon	1.76	n.a.	1.56
		Low-e	1.73	n.a.	1.54
		Low-e + Argon	1.64	n.a.	1.47

TABLE 10-6E
GROUP R OCCUPANCY:
DEFAULT U-FACTORS FOR OVERHEAD GLAZING

Glazing Type	Frame Type			
	Aluminum Without Thermal Break	Aluminum With Thermal Break	Reinforced Vinyl/ Aluminum-Clad Wood or Vinyl	Wood or Vinyl-Clad Wood/ Vinyl without Reinforcing
Single Glazing				
glass	U-1.58	U-1.51	U-1.40	U-1.18
acrylic/polycarb	U-1.52	U-1.45	U-1.34	U-1.11
Double Glazing				
air	U-1.05	U-0.89	U-0.84	U-0.67
argon	U-1.02	U-0.86	U-0.80	U-0.64
Double Glazing, e=0.20				
air	U-0.96	U-0.80	U-0.75	U-0.59
argon	U-0.91	U-0.75	U-0.70	U-0.54
Double Glazing, e=0.10				
air	U-0.94	U-0.79	U-0.74	U-0.58
argon	U-0.89	U-0.73	U-0.68	U-0.52
Double Glazing, e=0.05				
air	U-0.93	U-0.78	U-0.73	U-0.56
argon	U-0.87	U-0.71	U-0.66	U-0.50
Triple Glazing				
air	U-0.90	U-0.70	U-0.67	U-0.51
argon	U-0.87	U-0.69	U-0.64	U-0.48
Triple Glazing, e=0.20				
air	U-0.86	U-0.68	U-0.63	U-0.47
argon	U-0.82	U-0.63	U-0.59	U-0.43
Triple Glazing, e=0.20 on 2 surfaces				
air	U-0.82	U-0.64	U-0.60	U-0.44
argon	U-0.79	U-0.60	U-0.56	U-0.40
Triple Glazing, e=0.10 on 2 surfaces				
air	U-0.81	U-0.62	U-0.58	U-0.42
argon	U-0.77	U-0.58	U-0.54	U-0.38
Quadruple Glazing, e=0.10 on 2 surfaces				
air	U-0.78	U-0.59	U-0.55	U-0.39
argon	U-0.74	U-0.56	U-0.52	U-0.36
krypton	U-0.70	U-0.52	U-0.48	U-0.32

TABLE N1101.5 (2)
DEFAULT DOOR U-FACTORS

Door Type	U-Factor
Uninsulated Metal	1.20
Insulated Metal	0.60
Wood	0.50
Insulated, nonmetal edge, max 45% glazing, any glazing double pane	0.35

WSEC Ref	Differences
Table 10-6c	Different but can be easily changed
Description of Differences	
WSEC contains many default door U-factors based on construction type.	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	
Substitute WSEC language via amendment	

TABLE 10-6C
GROUP R OCCUPANCY:
DEFAULT U-FACTORS FOR DOORS

Door Type	No Glazing	Single Glazing	Double Glazing with ¼ in. Airspace	Double Glazing with ½ in. Airspace	Double Glazing with e=0.10, ½ in. Argon
SWINGING DOORS (Rough opening – 38 in. x 82 in.)					
Slab Doors					
Wood slab in wood frame[a]	0.46				
6% glazing (22 in. x 8 in. lite)	–	0.48	0.47	0.46	0.44
25% glazing (22 in. x 36 in. lite)	–	0.58	0.48	0.46	0.42
45% glazing (22 in. x 64 in. lite)	–	0.69	0.49	0.46	0.39
More than 50% glazing	Use Table 10-6A				
Insulated steel slab with wood edge in wood frame[a]	0.16				
6% glazing (22 in. x 8 in. lite)	–	0.21	0.20	0.19	0.18
25% glazing (22 in. x 36 in. lite)	–	0.39	0.28	0.26	0.23
45% glazing (22 in. x 64 in. lite)	–	0.58	0.38	0.35	0.26
More than 50% glazing	Use Table 10-6A				
Foam insulated steel slab with metal edge in steel frame[b]	0.37				
6% glazing (22 in. x 8 in. lite)	–	0.44	0.42	0.41	0.39
25% glazing (22 in. x 36 in. lite)	–	0.55	0.50	0.48	0.44
45% glazing (22 in. x 64 in. lite)	–	0.71	0.59	0.56	0.48
More than 50% glazing	Use Table 10-6A				
Cardboard honeycomb slab with metal edge in steel frame[b]	0.61				
Style and Rail Doors					
Sliding glass doors/French doors	Use Table 10-6A				
Site-Assembled Style and Rail Doors					
Aluminum in aluminum frame	–	1.32	0.99	0.93	0.79
Aluminum in aluminum frame with thermal break	–	1.13	0.80	0.74	0.63
REVOLVING DOORS (Rough opening – 82 in. x 84 in.)					
Aluminum in aluminum frame					
Open	–	1.32	–	–	–
Closed	–	0.65	–	–	–
SECTIONAL OVERHEAD DOORS (Nominal – 10 ft x 10 ft)					
Uninsulated steel (nominal U=1.15)[c]	1.15	–	–	–	–
Insulated steel (nominal U=0.11)[c]	0.24	–	–	–	–
Insulated steel with thermal break (nominal U=0.08)[c]	0.13	–	–	–	–

TABLE N1101.5 (3)
DEFAULT GLAZED FENESTRATION SHGC

Single Glazed		Double Glazed		Glazed Block
Clear	Tinted	Clear	Tinted	
~~0.7~~ 0.8	~~0.6~~ 0.7	~~0.6~~ 0.7	~~0.5~~ 0.6[2]	0.6

WSEC Ref	Differences
None	Does not apply to Washington
Description of Differences	
SHGC does not apply to residential occupancies in Washington	
SubTAG Recommendation	
Consensus?	
Keep IRC language	

N1106 Installation. All materials, systems and equipment shall be installed in accordance with the manufacturer's installation instructions and the provisions of this code.

WSEC Ref	Differences
502.1.4.1	Substantially the same
Description of Differences	
WSEC appears in the insulation section only. IRC encompasses all materials, systems etc.	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1101.6.1 Protection of exposed foundation insulation. Insulation applied to the exterior of basement walls, crawl space walls, and the perimeter of slab-on-grade floors shall have a rigid, opaque and weather-resistant protective covering to prevent the degradation of the insulation's thermal performance. The protective covering shall cover the exposed exterior insulation and extend a minimum of 6 inches (153 mm) below grade.

WSEC Ref	Differences
502.1.4.8	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1101.7 Above code programs. The building official or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this chapter. Buildings approved in writing by such an energy efficiency program shall be considered in compliance with this chapter.

WSEC Ref	Differences
None	IRC only
Description of Differences	
WSEC is a mini-maxi code	
SubTAG Recommendation	
Delete via amendment	
Consensus?	
No consensus	

N1101.8 Certificate. A permanent certificate shall be posted on or in the electrical distribution panel. The certificate shall be completed by the builder or registered design professional. The certificate shall list the predominant R-values of insulation installed in or on ceiling/roof, walls, foundation (slab, basement wall, crawlspace wall and/or floor) and ducts outside conditioned spaces; V-factors *for* fenestration; and the solar heat gain coefficient (SHGC) of fenestration. Where there is more than one value *f* or each component, the certificate shall list the value covering the largest area. The certificate shall list the type and efficiency of heating, cooling and service water heating equipment.

WSEC Ref	Differences
None	IRC only
Description of Differences	
WSEC does not require a certificate	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

SECTION N1102.
BUILDING THERMAL ENVELOPE

N1102.1 Insulation and fenestration criteria. The building thermal envelope shall meet the requirements of Table N 1102.1 based on the climate zone specified in Table N1101.2.

[2] EC2

WSEC Ref	Differences
601.1	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1102.1.1 R-value computation. Insulation material used in layers, such as framing cavity insulation and insulating sheathing, shall be summed to compute the component R-value. The manufacturer's settled R-value shall be used *for* blown insulation. Computed R-values shall not include an R-value for other building materials or air films.

WSEC Ref	Differences
601.1	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1102.1.2 U-factor alternative. An assembly with a *V*-factor equal to or less than that specified in Table N 11 02.1.2 shall be permitted as an alternative to the R-value in Table N1102.1.

Exception: For mass walls not meeting the criterion *for* insulation location in Section N1102.2.3, the *U*-factor shall be permitted to be:

a) U-factor of 0.17 in Climate Zone 1
b) U-factor of 0.14 in Climate Zone 2
c) U-factor of 0.12 in Climate Zone 3
d) U-factor of 0.10 in Climate Zone 4 except Marine
e) U-factor of 0.082 in Climate Zone 5 and Marine 4[3]

WSEC Ref	Differences
Table 6-1, Table 6-2	Substantially the same
Description of Differences	
WSEC does not specifically state that assemblies with U-factors equal to, or less than, the prescriptive values comply with the code. It is inferred in some instances with U-factors parenthetically noted in the prescriptive tables for some, but not all, assemblies. WSEC does not have specific mass wall values	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	
Delete exception	

N1102.1.3 Total UA alternative. If the total building thermal envelope UA (sum of U-factor times assembly area) is less than or equal to the total UA resulting from using the U-factors in Table N1102.1.2 (multiplied by the same assembly area as in the proposed building), the building shall be considered in compliance with Table N1102.1. The UA calculation shall be done using a method consistent with the ASHRAE *Handbook of Fundamentals* and shall include the thermal bridging effects of framing materials. The SHGC requirements shall be met in addition to UA compliance.

WSEC Ref	Differences
502.1.1	Substantially the same
Description of Differences	
WSEC includes language that is very similar to IECC but in addition provides 3 equations and a target component values in WSEC Table 5-1. WSEC uses 15% glazing, IRC uses same area as target building WSEC includes referenced u-factors in chapter 10	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	
Substitute WSEC language via amendment	

[3] EC 23

WSEC Ref	Differences
Ch. 10	WSEC only
Description of Differences	
WSEC includes an extensive list of default U-factors that may be utilized when using a component performance approach. Include text that references this data and include it in the code.	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	
Substitute WSEC language via amendment	

N1102.2 Specific insulation requirements.

N1102.2.1 Ceilings with attic spaces. When Section N1102.1 would require R-38 in the ceiling, R-30 shall be deemed to satisfy the requirement for R-38 wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves. Similarly R-38 shall be deemed to satisfy the requirement for R-49 wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves.

WSEC Ref	Differences
502.1.4.5	
Description of Differences	
Add WSEC language for clarity Open-blown or poured loose fill insulation may be used in attic spaces where the slope of the ceiling is not more than 3 feet in 12 and there is at least 30 inches of clear distance from the top of the bottom chord of the truss or ceiling joist to the underside of the sheathing at the roof ridge. When eave vents are installed, baffling of the vent openings shall be provided so as to deflect the incoming air above the surface of the insulation. Baffles shall be rigid material, resistant to wind driven moisture. Requirements for baffles for ceiling insulation shall meet the International Building Code Section 1203.2 for minimum ventilation requirements. When feasible, the baffles shall be installed from the top of the outside of the exterior wall, extending inward, to a point 6 inches vertically above the height of noncompressed insulation, and 12 inches vertically above loose fill insulation.	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	
Substitute WSEC language via amendment	

N1102.2.2 Ceilings without attic spaces. Where Section N1102.1 would require insulation levels above R-30 and the design of the roof/ceiling assembly does not allow sufficient space *for* the required insulation, the minimum required insulation *for* such roof/ceiling assemblies shall be R-30. This reduction of insulation from the requirements of Section N1102.1 shall be limited to 500 *ft2* (46 m2) of ceiling area.

WSEC Ref	Differences
	Substantially the same
Description of Differences	
WSEC allows R-30 for all vaults with no maximum area.	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1102.2.3 Mass walls. Mass walls, for the purposes of this chapter, shall be considered walls of concrete block, concrete, insulated concrete form (ICF), masonry cavity, brick (other than brick veneer), earth (adobe, compressed earth block, rammed earth) and solid timber/logs. The provisions of Section N1102.1 for mass walls shall be applicable when at least 50 percent of the required insulation R-value is on the exterior of, or integral to, the wall. Walls that do not meet this criterion for insulation placement shall meet the wood frame wall insulation requirements of Section N1102.1.

Exception: For walls that do not meet this criterion for insulation placement the minimum added insulation R-value shall be permitted to be:

a) R-value of 4 in Climate Zone 1
b) R-value of 6 in Climate Zone 2
c) R-value of 8 in Climate Zone 3
d) R-value of 10 in Climate Zone 4 except Marine
e) R-value of 13 in Climate Zone 5 and Marine 4[4]

WSEC Ref	Differences
	IECC only
Description of Differences	
WSEC does not have a separate insulation requirement for mass walls	
SubTAG Recommendation	
Delete via amendment	
Consensus?	
Delete via amendment	

[4] EC26

N1102.2.4 Steel-frame ceilings, walls and floors. Steel-frame ceilings, walls and floors shall meet the insulation requirements of Table N1102.2.4 or shall meet the U-*f*actor requirements in Table N1102.1.2. The calculation of the *U-factor* for a steel-frame envelope assembly shall use a series-parallel path calculation method.

WSEC Ref	Differences
Description of Differences	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1102.2.5 Floors. Floor insulation shall be installed to maintain permanent contact with the underside of the subfloor decking.

WSEC Ref	Differences
502.1.4.7, 602.5	Different but can be easily changed
Description of Differences	
WSEC language addresses support of floor insulation and prohibits blocking foundation vents with insulation.	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	
Substitute WSEC language via amendment	

N1102.2.6 Basement walls. Exterior walls associated with conditioned basements shall be insulated from the top of the basement wall down to 10 feet (3048 mm) below grade or to the basement floor, whichever is less. Walls associated with unconditioned basements shall meet this requirement unless the floor overhead is insulated in accordance with Sections N1102.1 and N1102.2.5.

WSEC Ref	Differences
502.1.4.10, 602.3	Substantially the same
Description of Differences	
WSEC requires insulation installed on the exterior of a below grade wall extend to the top of the footing. IRC/IECC only requires insulation first 10 ft, WSEC requires full wall	

SubTAG Recommendation
Substitute WSEC language via amendment
Consensus?
Substitute WSEC language via amendment

N1102.2.7 Slab-on-grade floors. Slab-on-grade floors with a floor surface less than 12 inches below grade shall be insulated in accordance with Table N1102.1. The insulation shall extend downward from the top of the slab on the outside or inside of the foundation wall. Insulation located below grade shall be extended the distance provided in Table N1102.1 by any combination of vertical insulation, insulation extending under the slab or insulation extending out from the building. Insulation extending away from the building shall be protected by pavement or by a minimum of 10 inches (254 mm) of soil. The top edge of the insulation installed between the exterior wall and the edge of the interior slab shall be permitted to be cut at a 45-degree (0.79 rad) angle away from the exterior wall. Slab-edge insulation is not required in jurisdictions designated by the code official as having a very heavy termite infestation.

WSEC Ref	Differences
502.1.4.8, 502.1.4.9, 602.4	Substantially the same
Description of Differences	
Mostly the same language except for turning the exterior insulation outward from the building. WSEC includes language requiring insulation of heated slab	
SubTAG Recommendation	
Amend with WSEC requirement	
Consensus?	
Amend with WSEC requirement	

N1102.2.8 Crawl space walls. As an alternative to insulating floors over crawl spaces, crawl space walls shall be permitted to be insulated when the crawl space is not vented to the outside. Crawl space wall insulation shall be permanently fastened to the wall and extend downward from the floor to the finished grade level and then vertically and/or horizontally for at least an additional 24 inches (610 mm). Exposed earth in unvented crawl space foundations shall be covered with a continuous vapor retarder. All joints of the vapor retarder shall overlap by 6 inches (153 mm) and be sealed or taped. The edges of the vapor retarder shall extend at least 6 inches (153 mm) up the stem wall and shall be attached to the stem wall.

WSEC Ref	Differences
VIAQ 502.1.3	IECC only
Description of Differences	
WAVIAQ only mentions enclosed crawl spaces when using the crawl space as a supply plenum. There has been no data presented that this system is a benefit to houses in our climate zones. Increased energy consumption will occur by adding the volume of the crawl space to condition. If this section is adopted, a radon mitigation system should be mandatory.	
SubTAG Recommendation	
Delete via amendment	
Consensus?	
Delete via amendment	

N1102.2.9 Masonry veneer. Insulation shall not be required on the horizontal portion of the foundation that supports a masonry veneer.

WSEC Ref	Differences
	IECC only
Description of Differences	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1102.2.10 Thermally isolated sunroom insulation. The minimum ceiling insulation R-values shall be R-19 in zones 1 through 4 and R-24 in zones 5 though 8. The minimum wall R-value shall be R-13 in all zones. New wall(s) separating the sunroom from conditioned space shall meet the building thermal envelope requirements.

WSEC Ref	Differences
	IECC only
Description of Differences	
WSEC does not reduce the insulation requirements for sunrooms.	
SubTAG Recommendation	
Delete via amendment	
Consensus?	
Delete via amendment	

N1102.3 Fenestration.

N1102.3.1 *U-factor.* An area-weighted average of fenestration products shall be permitted to satisfy the U-factor requirements.

WSEC Ref	Differences
602.7.2	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1102.3.2 Glazed fenestration SHGC. An area-weighted average of fenestration products more than 50 percent glazed shall be permitted to satisfy the solar heat gain coefficient (SHGC) requirements.

WSEC Ref	Differences
	Does not apply to Washington
Description of Differences	
Does not apply to residential occupancies	
SubTAG Recommendation	
Delete via amendment	
Consensus?	
Keep IRC language	

N1102.3.3 Glazed fenestration exemption. Up to 15 f*t2* (1.4 m2) of glazed fenestration per dwelling unit shall be permitted to be exempt from *U-factor* and solar heat gain coefficient (SHGC) requirements in Section N1102.1.

WSEC Ref	Differences
602.7.2 Exception	Substantially the same
Description of Differences	
WSEC uses 1% of the floor area for the maximum amount of exempt glass. The word “square” should be added to text before “feet”.	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1102.3.4 Opaque door exemption. One opaque door assembly is exempted from the *U-factor* requirement in Section N11 02.1.

WSEC Ref	Differences
502.1.5.2 Exception #3, 602.6 Exception #2	Different but can be easily changed
Description of Differences	
WSEC limits the maximum area of exempt opaque door area at 24 ft2	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	
Substitute WSEC language via amendment	

N1102.3.5 Thermally isolated sunroom *U-factor.* For zones 4 through 8 the maximum fenestration *U-factor* shall be 0.50 and the maximum skylight U-*factor* shall be 0.75. New windows and doors separating the sunroom from conditioned space shall meet the building thermal envelope requirements.

WSEC Ref	Differences
	IECC only
Description of Differences	
WSEC does not reduce fenestration U-factors for sunrooms.	
SubTAG Recommendation	
Delete via amendment	
Consensus?	
Delete via amendment	

N1102.3.6 Replacement fenestration. Where some or all of an existing fenestration unit is replaced with a new fenestration product, including ~~frame;~~ [5]sash and glazing, the replacement fenestration unit shall meet the applicable requirements for V-factor and solar heat gain coefficient (SHGC) in Table N1102.1.

WSEC Ref	Differences
101.3.2.5 Exception #1	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

[5] EC30

N1102.4 Air leakage.

N1102.4.1 Building thermal envelope. The building thermal envelope shall be durably sealed to limit infiltration. The sealing methods between dissimilar materials shall allow for differential expansion and contraction. The following shall be caulked, gasketed, weatherstripped or otherwise sealed with an air barrier material, suitable film or solid material.
1. All joints, seams and penetrations.
2. Site-built windows, doors and skylights.
3. Openings between window and door assemblies and their respective jambs and framing.
4. Utility penetrations.
5. Dropped ceilings or chases adjacent to' the thermal envelope.
6. Knee walls.
7. Walls and ceilings separating the garage from conditioned spaces.
8. Behind tubs and showers on exterior walls.
9. Common walls between dwelling units.
10. Other sources of infiltration.

WSEC Ref	Differences
502.4	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1102.4.2 Fenestration air leakage. Windows, skylights and sliding-glass doors shall have an air infiltration rate of no' more than 0.3 cfm/ft2 [1.5(L/s)/m2], and swinging doors no more than 0.5 cfm/ft2 [2.5(L/s)/m2], when tested according to NFRC 400, 101/I.S.2, or 101/I.S.2/NAFS by an accredited, independent laboratory, and listed and labeled by the manufacturer.

Exception: Site-built windows, skylights and doors.

WSEC Ref	Differences
502.4.2	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1102.4.3 Recessed lighting. Recessed luminaires installed in the building thermal envelope shall be sealed to limit air leakage between conditioned and unconditioned spaces by being:

1. IC-rated and labeled with enclosures that are sealed or gasketed to' prevent air leakage to' the ceiling cavity or unconditioned space; or

2. IC-rated and labeled as meeting ASTM E 283 when tested at 1.57 psi (75 Pa) pressure differential with no' mare than 2.0 cfm (0.944 L/s) of air movement from the conditioned space to' the ceiling cavity; or

3. Located inside an airtight sealed box with clearances of at least 0.5 inch (12.7 mm) from combustible material and 3 inches (76 mm) from insulation.

WSEC Ref	Differences
502.4.4	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1102.5 Moisture control. The building design shall not create conditions of accelerated deterioration from moisture condensation. Above-grade frame walls, floors and ceilings not ventilated to' allow moisture to' escape shall be provided with an approved vapor retarder. The vapor retarder shall be installed an the warm-in-winter side of the thermal insulation.

Exceptions:

1. In construction where moisture or its freezing will not damage the materials.
2. Frame walls, floors and ceilings in jurisdictions in Zones ~~1 through 4~~1, 2, 3, 4A and 4B[6]. (Crawl space floor vapor retarders are not exempted.)
3. Where other approved means to avoid condensation are provided.

WSEC Ref	Differences
502.1.6.1	Different but can be easily changed
Description of Differences	
WSEC contains specific vapor retarder requirements for various building assemblies. IECC does not require a ventilation space in ceilings and apparently does not require a ground cover in a crawl space. No requirement for a ground cover was found in IRC	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1102.5.1 Maximum fenestration *U-factor.* The area weighted average maximum fenestration U-factor permitted using trade offs from Section N1102.1.3 in Zones 6 through 8 shall be 0.55. To comply with this section, the maximum U-factor for skylights shall be 0.75 in zones 6 through 8.[7]

WSEC Ref	Differences
	IECC only
Description of Differences	
SubTAG Recommendation	
Keep IRC	
Consensus?	
Keep IRC language	

SECTION N1103
SYSTEMS

N1103.1 Controls. At least one thermostat shall be provided far each separate heating and cooling system.

WSEC Ref	Differences
503.8.1	Different but can be easily changed
Description of Differences	
WSEC specifically states temperature ranges for t-stats controlling heating or cooling. When the stat is used for both heating and cooling a 10o deadband is required.	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	
Substitute WSEC language via amendment	

[6] EC33

[7] EC38

N1103.1.1 Heat pump supplemental heat. Heat pumps having supplementary electric resistance heat shall have controls that, except during defrost, prevent supplemental heat operation when the heat pump compressor can meet the heating load.[8]

WSEC Ref	Differences
	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1103.2 Ducts.

N1103.2.1 Insulation. Supply and return ducts shall be insulated to' a minimum of R-8. Ducts in floor trusses shall be insulated to a minimum of R-6.

Exception: Ducts or portions thereof located completely inside the building thermal envelope.

WSEC Ref	Differences
503.9	Different but can be easily changed
Description of Differences	
WSEC does not reduce the required R-value for ducts in a floor truss. If this is adopted, additional language should be added allowing the reduction if required floor insulation is installed to the exterior of the duct.	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	
Substitute WSEC language via amendment	

N1103.2.2 Sealing. All ducts, air handlers, filter boxes and building cavities used as ducts shall be sealed. Joints and seams shall comply with M1601.3.1.

WSEC Ref	Differences
503.10.2	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1103.2.3 Building cavities. Building framing cavities shall not be used as supply ducts.

WSEC Ref	Differences
	IECC only
Description of Differences	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1103.3 Mechanical system piping insulation. Mechanical system piping capable of carrying fluids above 105°F (40°C) or below 55°F (13°C) shall be insulated to' a minimum of R-2.

WSEC Ref	Differences
503.11, Table 5-12	Different but can be easily changed
Description of Differences	
WSEC requires R-3 pipe insulation	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	
Substitute WSEC language via amendment	

N1103.4 Circulating hot water systems. All circulating service hot water piping shall be insulated to at least R-2. Circulating hot water systems shall include an automatic or readily accessible manual switch that can turn off the hot water circulating pump when the system is not in use.

WSEC Ref	Differences
	IECC only
Description of Differences	
WSEC used to have language regarding insulation of pipes for circulating hot water systems. Keep IRC but increase R-value to R-3	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Substitute WSEC language via amendment	

N1103.5 Mechanical ventilation. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

[8] EC42

WSEC Ref	Differences
VIAQ	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Keep IRC language	

N1103.6 Equipment sizing. Heating and cooling equipment shall be sized as specified in Section M140 1 .3.

WSEC Ref	Differences
WAVIAQ 302.2.3	Substantially the same
Description of Differences	
WSEC allows whole building calc or prescriptive budget, IRC requires room by room heat loss calculation	
SubTAG Recommendation	
Keep IRC language	
Consensus?	
Substitute WSEC language	

TABLE N1102.2
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT [a]

See comparison done at end of chapter

Climate Zone	Fenestration U-Factor	Skylight[b] U-Factor	Glazed Fenestration SHGC	Ceiling R-value	Wood Frame Wall R-Value	Mass Wall R-Value	Floor R-value	Basement[c] wall R-Value	Slab[d] R-Value & Depth	Crawl space[c] wall R-Value
1	1.2	0.75	0.40	30	13	3	13	0	0	0
2	0.75	0.75	0.40	30	13	4	13	0	0	0
3	0.65	0.65	0.40[e]	30	13	5	19	0	0	5/13
4 except Marine	0.40	0.60	NR	38	13	5	19	10/13	10, 2ft	10/13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13	30[f]	10/13	10, 2ft	10/13
6	0.35	0.60	NR	49	19 or 13+5[g]	15	30[f]	10/13	10, 4ft	10/13
7 and 8	0.35	0.60	NR	49	21	19	30[f]	10/13	10, 4ft	10/13

a. R-values are minimums. U-factors and SHGC are maximums. R-19 insulation shall be permitted to be compressed into a 2x6 cavity.
b. The fenestration U-factor column excludes skylights. The solar heat gain coefficient (SHGC) column applies to all glazed fenestration.
c. The first R-value applies to continuous insulation, the second to framing cavity insulation; either insulation meets the requirement.
d. R-5 shall be added to the required slab edge R-values for heated slabs.
e. There are no solar heat gain coefficient (SHGC) requirements in the Marine Zone.
f. Or insulation sufficient to fill the framing cavity, R-19 minimum.
g. "13+5" means R-13 cavity insulation plus R-5 insulated sheathing. If structural sheathing covers 25% or less of the exterior, R-5 sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25% of the exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.

TABLE N1101.1.2
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling R-value	Frame Wall R-Value	Mass Wall R-Value	Floor R-value	Basement wall R-Value	Crawl space wall R-Value
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.75	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.65	0.65	0.035	0.082	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.059	0.065

a. Nonfenestration U-factors shall be obtained from measurement, calculation or an approved source.

WSEC Ref	**Differences**
None	IRC only
Description of Differences	
WSEC does not have an prescriptive U-factor table	
SubTAG Recommendation	
Keep IRC	
Consensus?	
No consensus—need to see how the values line up	

Table N1102.2.4
Steel-frame Ceiling, Wall and floor insulation (R-values)

Wood Frame R-Value Requirement	Cold-Formed Steel Equivalent R-Value[a]
Steel Truss Ceilings[a]	
R-30	R-38 or R-30+3 or R-26+5
R-38	R-49 or R-38+3
R-49	R-38+5
Steel Joist Ceilings[b]	
R-30	R-38 in 2x4 or 2x6 or 2x8 R-49 in any framing
R-38	R-49 in 2x4 or 2x6 or 2x8 or 2x10
Steel Framed Wall	
R-13	R-13+5 or R-15+4 or R-21+3
R-19	R-13+9 or R-19+8 or R-25+7
R-21	R-13+10 or R-19+9 or R-25+8
Steel Joist Floor	
R-13	R-19 in 2x6 R19+R-6 in 2x8 or 2x10
R-19	R-19+R-6 in 2x6 R-19+R-12 in 2x8 or 2x10

For SI: 1 inch = 25.4 mm

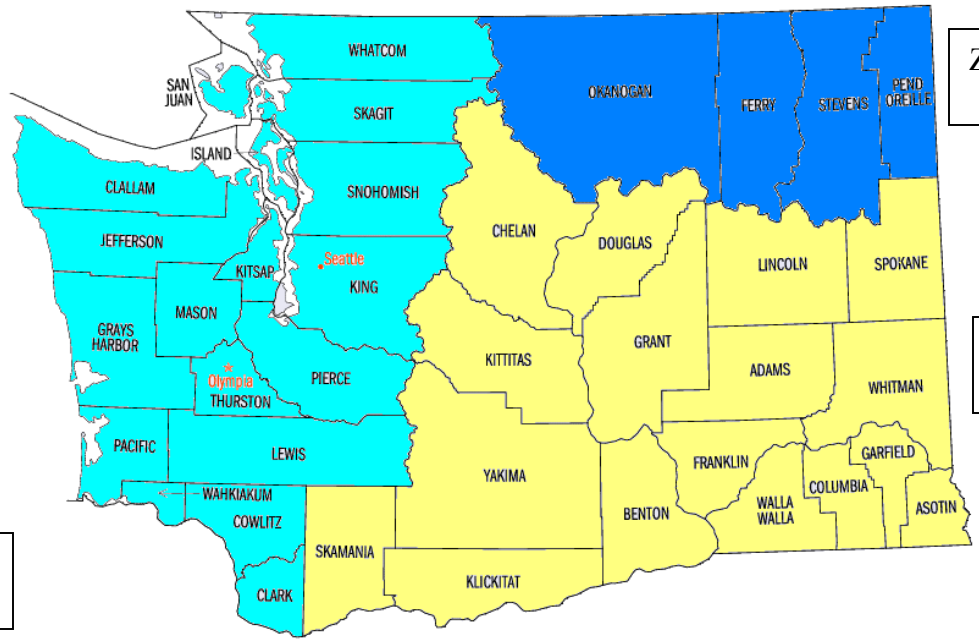
Notes:

a. Cavity insulation R-value is listed first, followed by continuous insulation R-value.

b. Insulation exceeding the height of the framing shall cover the framing.

WSEC Ref	**Differences**
None	IRC only
Description of Differences	
WSEC does not contain an equivalent U-factor table for steel framed buildings	
SubTAG Recommendation	
Keep IRC	
Consensus?	
Keep IRC language	

IECC Climate Zones

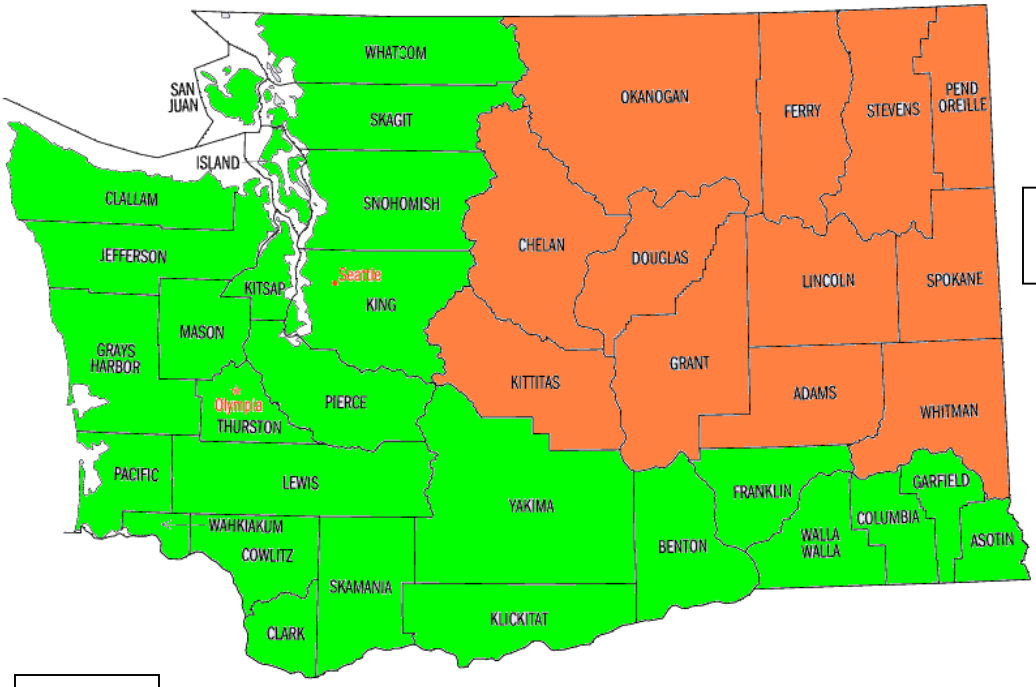


Zone 6

Zone 5

Marine 4

WSEC Climate Zones



Zone 2

Zone 1

Comparison of Okanogan, Ferry, Stevens and Pend Oreille Counties
IECC Climate Zone 6, WSEC Climate Zone 2

Shaded boxes are more stringent (all tables)

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
IECC 6	0.35	0.60	NR	49	19 or 13+5 or 13+6g	15	30f	10 / 13	10, 4 ft	10 / 13
WSEC 2*	0.40	0.58	NR**	38	21 Int. or 15+4 or 13 +5	21 Int. or 15+4 or 13 +5	30	12 / 21	10, 2 ft	NL***

* WSEC Reference case
** Not required
*** No listing in WSEC

Comparison of Chelan, Douglas, Lincoln, Spokane, Kittitas, Grant, Adams, and Whitman Counties
IECC Climate Zone 5, WSEC Climate Zone 2

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
IECC 5 and Marine 4	0.35	0.60	NR	38	19 or 13+5 or 13+6[g]	13	30[f]	10 / 13	10, 2 ft	10 / 13
WSEC 2*	0.40	0.58	NR**	38	21 Int. or 15+4 or 13 +5	21 Int. or 15+4 or 13 +5	30	12 / 21	10, 2 ft	NL***

* WSEC Reference case
** Not required
*** No listing in WSEC

Comparison of Skamania, Yakima, Klickitat, Benton, Franklin, Walla Walla, Columbia, Garfield, and Asotin Counties
IECC Climate Zone 5, WSEC Climate Zone 1

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
IRC 5 and Marine 4	0.35	0.60	NR	38	19 or 13+5 or 13+6[g]	13	30[f]	10 / 13	10, 2 ft	10 / 13
WSEC 1*	0.40	0.58	NR**	38	21 or 15+4 or 13 +5	21 or 15+4 or 13 +5	30	10 / 21	10, 2 ft	NL***

* WSEC Reference case

** Not required
*** No listing in WSEC

Comparison of Whatcom, Skagit, Snohomish, King, Pierce, Lewis, Cowlitz, Wahkiakum, Pacific, Grays Harbor, Thurston, Mason, Jefferson and Clallam Counties
IECC Climate Zone Marine 4, WSEC Climate Zone 1

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
IRC 5 and Marine 4	0.35	0.60	NR	38	19 or 13+5 or 13+6[g]	13	30[f]	10 / 13	10, 2 ft	10 / 13
WSEC 1*	0.40	0.58	NR**	38	21 or 15+4 or 13 +5	21 or 15+4 or 13 +5	30	10 / 21	10, 2 ft	NL***

* WSEC Reference case
** Not required
*** No listing in WSEC

IECC Footnotes:
a. R-values are minimums. *U-factors* and SHGC are maximums. R-19 shall be permitted to be compressed into a 2 x 6 cavity.
b. The fenestration *U-factor* column excludes skylights. The SHGC column applies to all glazed fenestration.
c. The first R-value applies to continuous insulation, the second to framing cavity insulation; either insulation meets the requirement.
d. R-5 shall be added to the required slab edge R-values for heated slabs.
e. There are no SHGC requirements in the Marine zone.
f. Or insulation sufficient to fill the framing cavity, R-19 minimum.
g "15+5" means R-15 cavity insulation plus R-5 insulated sheathing. sheathing. "13+6" means R-13 cavity insulation plus R-6 insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, R-5 sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.[9]

WSEC Ref	**Differences**
Tables 6-1, 6-2	
Description of Differences	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	
Substitute WSEC language via amendment	

Missing list of items not represented in IRC – Gary/Chuck will attempt to incorporate.

[9] EC19

IECC CHAPTER 4
RESIDENTIAL ENERGY EFFICIENCY

(See Nonresidential portion for Chapters 1, 2 and 3, which are also applicable)

SECTION 401
GENERAL

401.1 Scope. This chapter applies to residential buildings.

WSEC Ref	Differences
101.3, 401.1, 501.1, 601.1	Substantially the same
Description of Differences	
Scope of residential is different—the definition of residential building is different: IECC - RESIDENTIAL BUILDING. For this code, includes R-3 buildings, as well as R-2 and R-4 buildings three stories or less in height above grade. WSEC – All Group R Occupancies	
SubTAG Recommendation	
Keep IECC language	
Consensus?	
Keep IECC language—decide on def of residential after review of chapt 4&8	

401.2 Compliance. ~~Compliance shall be demonstrated by meeting each of the applicable provisions of this chapter.~~ Projects shall comply with Sections 401, 402.4, 402.5 and 403 (referred to as the mandatory provisions) and either:

1. Sections 402.1 through 402.3 (prescriptive) or
2. Section 404 (performance.[10]

WSEC Ref	Differences
101.2	Different but can be easily changed
Description of Differences	
WSEC has extensive language regarding the three paths of compliance. An individual will have to read through IECC Chapter 4 to determine the compliance alternatives allowed.	
SubTAG Recommendation	
Substitute WSEC language via amendment (for clarification) or EC 56 may cover if it passes	
Consensus?	
TBD	

[10] EC56

401.3 Certificate. A permanent certificate shall be posted on or in the electrical distribution panel. The certificate shall be completed by the builder or registered design professional. The certificate shall list the predominant *R*-values of insulation installed in or on ceiling/roof, walls, foundation (slab, basement wall, crawlspace wall and/or floor) and ducts outside conditioned spaces; U-factors for fenestration; and, ~~where requirements apply~~,[11] the solar heat gain coefficient (SHGC) of fenestration. Where there is more than one value for each component, the certificate shall list the value covering the largest area. The certificate shall list the type and efficiency of heating, cooling and service water heating equipment.

WSEC Ref	Differences
	IECC only
Description of Differences	
SubTAG Recommendation	
Keep IECC language	
Consensus?	
Keep IECC language	

SECTION 402
BUILDING THERMAL ENVELOPE

402.1 Insulation and fenestration criteria. The building thermal envelope shall meet the requirements of Table 402.1 based on the climate zone specified in Chapter 3.

WSEC Ref	Differences
501.1, 601.1	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IECC language	
Consensus?	
Keep IECC language	

402.1.1 R-value computation. Insulation material used in layers, such as framing cavity insulation and insulating sheathing, shall be summed to compute the component R-value. The manufacturer's settled R-value shall be used for

[11] EC13

blown insulation. Computed R-values shall not include an R-value for other building materials or air films.

WSEC Ref	Differences
601.1	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IECC language	
Consensus?	
Keep IECC language	

402.1.2 U-factor alternative. An assembly with a U-factor equal to or less than that specified in Table 402.1.2 shall be permitted as an alternative to the R-value in Table 402.1.

Exception: For mass walls not meeting the criterion for insulation location in Section 402.2.3, the U-factor shall be permitted to be:

1. U-factor of 0.17 in Climate Zone 1
2. U-factor of 0.14 in Climate Zone 2
3. U-factor of 0.12 in Climate Zone 3

WSEC Ref	Differences
Table 6-1, Table 6-2	Substantially the same
Description of Differences	
WSEC does not specifically state that assemblies with U-factors equal to, or less than, the prescriptive values comply with the code. It is inferred in some instances with U-factors parenthetically noted in the prescriptive tables for some, but not all, assemblies.	
SubTAG Recommendation	
Keep IECC language	
Consensus?	
Keep IECC language	

402.1.3 Total UA alternative. If the total building thermal envelope UA (sum of U-factor times assembly area) is less than or equal to the total UA resulting from using the U-factors in Table 402.1.2 (multiplied by the same assembly area as in the proposed building), the building shall be considered in compliance with Table 402.1. The UA calculation shall be done using a method consistent with the ASHRAE *Handbook of Fundamentals* and shall include the thermal bridging effects of framing materials. The SHGC requirements shall be met in addition to UA compliance.

WSEC Ref	Differences
502.1.1	Substantially the same
Description of Differences	
WSEC includes language that is very similar to IECC but in addition provides 3 equations and a target component values in WSEC Table 5-1.	
SubTAG Recommendation	
Keep IECC language Amend to include a reference to [WSEC Ch 10 as appendix and equations]	
Consensus?	
Incorporate WSEC language	

402.2 Specific insulation requirements.

402.2.1 Ceilings with attic spaces. When Section 402.1 would require R-38 in the ceiling, R-30 shall be deemed to satisfy the requirement for R-38 wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves. Similarly R-38 shall be deemed to satisfy the requirement for R-49 wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves.

WSEC Ref	Differences
	IECC only
Description of Differences	
SubTAG Recommendation	
Keep IECC language	
Consensus?	

WSEC Ref	Differences
502.1.4.5	WSEC only
Description of Differences	
Add WSEC language for clarity Open-blown or poured loose fill insulation may be used in attic spaces where the slope of the ceiling is not more than 3 feet in 12 and there is at least 30 inches of clear distance from the top of the bottom chord of the truss or ceiling joist to the underside of the sheathing at the roof ridge. When eave vents are installed, baffling of the vent openings shall be provided so as to deflect the incoming air above the surface of the insulation. Baffles shall be rigid material, resistant to wind driven moisture. Requirements for baffles for ceiling insulation shall meet the International Building Code Section 1203.2 for minimum ventilation requirements. When feasible, the baffles shall be installed from the top of the outside of the exterior wall, extending inward, to a point 6 inches vertically above the height of noncompressed insulation, and 12 inches vertically	

above loose fill insulation.
SubTAG Recommendation
Add WSEC language via amendment
Consensus?
Add WSEC language; add title and reference in Chapter 8

402.2.2 Ceilings without attic spaces. Where Section 402.1 would require insulation levels above R-30 and the design of the roof/ceiling assembly does not allow sufficient space for the required insulation, the minimum required insulation for such roof/ceiling assemblies shall be R-30. This reduction of insulation from the requirements of Section 402.1 shall be limited to 500 ft^2 of ceiling area.

WSEC Ref	Differences
Table 6-1/6-2	Substantially the same
Description of Differences	
WSEC allows R-30 for all vaults with no maximum area.	
SubTAG Recommendation	
Keep IECC language	
Consensus?	
Keep IECC language	

WSEC Ref	Differences
502.1.6.3	WSEC only
Description of Differences	
Add WSEC language for clarity Single rafter joist vaulted ceiling cavities shall be of sufficient depth to allow a minimum one inch vented air space above the insulation.	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	

WSEC Ref	Differences
502.1.4.7	WSEC only
Description of Differences	
Add WSEC language for clarity Wall Insulation: Insulation installed in exterior walls shall comply with the provisions of this section. All wall insulation shall fill the entire framed cavity. Exterior wall cavities isolated during framing shall be fully insulated to the levels of the surrounding walls. All faced insulation shall be face stapled to avoid compression. EXCEPTION: Framed cavity can be empty or partially filled provided: 1. The wall assembly calculations are performed along with a completed performance calculation for the whole building; and 2. Insulation installed in partially filled cavities is not included in the performance calculation.	
SubTAG Recommendation	
Add WSEC language via amendment	
Consensus?	
Add as Section 402.2.12. Retitle? Reference in Chapter 8. May not need to be in Ch 4 depending on final scope of "residential building"	

402.2.3 Mass walls. Mass walls for the purposes of this Chapter shall be considered walls of concrete block, concrete, insulated concrete form (ICF), masonry cavity, brick (other than brick veneer), earth (adobe, compressed earth block, rammed earth) and solid timber/logs. The provisions of Section 402.1 for mass walls shall be applicable when at least 50 percent of the required insulation R-value is on the exterior of, or integral to, the wall. Walls that do not meet this criterion for insulation placement shall meet the wood frame wall insulation requirements of Section 402.1.

Exception: For walls that do not meet the criterion for insulation placement, the minimum added insulation R-value shall be permitted to be:

1. R-value of 4 in Climate Zone 1
2. R-value of 6 in Climate Zone 2
3. R-value of 8 in Climate Zone 3

WSEC Ref	Differences
Table 6-1, 6-2 (footnote #12)	WSEC only
Description of Differences	
WSEC allows a log wall exception to insulation requirements 12. Log and solid timber walls with a minimum average thickness of 3.5" are exempt from this insulation requirement.	

SubTAG Recommendation
Statutory requirement
Consensus?

402.2.4 Steel-frame ceilings, walls and floors. Steel frame ceilings, walls and floors shall meet the insulation requirements of Table 402.2.4 or shall meet the *U-factor* requirements in Table 402.1.2. The calculation of the *U-factor* for a steel-frame envelope assembly shall use a series-parallel path calculation method.

WSEC Ref	Differences
502.1	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IECC language	
Consensus?	

402.2.5 Floors. Floor insulation shall be installed to maintain permanent contact with the underside of the subfloor decking.

WSEC Ref	Differences
502.1.4.7, 602.5	Different but can be easily changed
Description of Differences	
WSEC language addresses support of floor insulation and prohibits blocking foundation vents with insulation.	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	

WSEC Ref	Differences
502.1.4.7	WSEC only
Description of Differences	
Add WSEC language for clarity: Insulation supports shall be installed so spacing is no more than 24 inches on center. Foundation vents shall be placed so that the top of the vent is below the lower surface of the floor insulation. EXCEPTION: Insulation may be omitted from floor areas over heated basements, heated garages or underfloor areas used as HVAC supply plenums. When foundation walls are insulated, the insulation shall be attached in a permanent manner. The insulation shall not block the airflow through foundation vents when installed. When foundation vents are not placed so that the top of the vent is below the lower surface of the floor insulation, a permanently attached baffle shall be installed at an angle of 30° from horizontal, to divert air flow below the lower surface of the floor insulation	
SubTAG Recommendation	
Consensus?	

402.2.6 Basement walls. Walls associated with conditioned basements shall be insulated from the top of the basement wall down to 10 feet below grade or to the basement floor, whichever is less. Walls associated with unconditioned basements shall meet this requirement unless the floor overhead is insulated in accordance with Sections 402.1 and 402.2.5.

WSEC Ref	Differences
502.1.4.10, 602.3	Substantially the same
Description of Differences	
WSEC requires insulation installed on the exterior of a below grade wall extend to the top of the footing. The IECC 10' language is not in the WSEC.	
SubTAG Recommendation	
Keep IECC language	
Consensus?	

402.2.7 Slab-on-grade floors. Slab-on-grade floors with a floor surface less than 12 inches (305 mm) below grade shall be insulated in accordance with Table 402.1. The insulation shall extend downward from the top of the slab on the outside or inside of the foundation wall. Insulation located below grade shall be extended the distance provided in Table 402.1 by any combination of vertical insulation, insulation extending under the slab or insulation extending out from the building. Insulation extending away from the building shall be protected by pavement or by a minimum of 1 0 inches (254 mm) of soil. The top edge of the insulation installed between the exterior wall and the edge of the interior slab shall be permitted to be cut at a 45-degree)0.79 rad) angle away from the exterior wall. Slab-edge insulation is not required in jurisdictions designated by the code official as having a very heavy termite infestation.

WSEC Ref	Differences
502.1.4.8, 602.4	Substantially the same
Description of Differences	
Mostly the same language except for turning the exterior insulation outward from the building.	
SubTAG Recommendation	
Keep IECC language	
Consensus?	

WSEC Ref	Differences
502.1.4.10	WSEC only
Description of Differences	
Add WSEC language for clarity Above-grade insulation shall be protected.	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	

WSEC Ref	Differences
502.1.4.9	WSEC only
Description of Differences	
Add WSEC language for clarity Radiant Slabs: The entire area of a radiant slab shall be thermally isolated from the soil with a minimum of R-10 insulation. The insulation shall be an approved product for its intended use. If a soil gas control system is present below the radiant slab, which results in increased convective flow below the radiant slab, the radiant slab shall be thermally isolated from the sub-slab gravel layer.	
SubTAG Recommendation	
Consensus?	

402.2.8 Crawl space walls. As an alternative to insulating floors over crawl spaces, crawl space walls shall be permitted to be insulated when the crawl space is not vented to the outside. Crawl space wall insulation shall be permanently fastened tot he wall and extend downward from the floor to the finished grade level and then vertically and/or horizontally for at least an additional 24 inches (610 mm). Exposed earth in unvented crawl space foundations shall be covered with a continuous vapor retarder. All joints of the vapor retarder shall overlap by 6 inches (153 mm) and be sealed or taped. The edges of the vapor retarder shall extend at least 6 inches (153 mm) up the stem wall and shall be attached to the stem wall.

WSEC Ref	Differences
VIAQ 502.1.3	IECC only
Description of Differences	
WAVIAQ only mentions enclosed crawl spaces when using the crawl space as a supply plenum. There has been no data presented that this system is a benefit to houses in our climate zones. Increased energy consumption will occur by adding the volume of the crawl space to condition. If this section is adopted, a radon mitigation system should be mandatory.	
SubTAG Recommendation	
Delete via amendment	
Consensus?	

402.2.9 Masonry veneer. Insulation shall not be required on the horizontal portion of the foundation that supports a masonry veneer.

WSEC Ref	Differences
	IECC only
Description of Differences	
SubTAG Recommendation	
Keep IECC language	
Consensus?	

402.2.10 Thermally isolated sunroom insulation. The minimum ceiling insulation R-values shall be R19 in zones 1 through 4 and R-24 in zones 5 though 8. The minimum wall R-value shall be R-13 in all zones. New wall(s) separating a sunroom from conditioned space shall meet the building thermal envelope requirements.

WSEC Ref	Differences
	IECC only
Description of Differences	
WSEC does not reduce the insulation requirements for sunrooms.	
SubTAG Recommendation	
Delete via amendment	
Consensus?	

WSEC Ref	Differences
502.1.4.4	WSEC only
Description of Differences	
WSEC contains requirements for crawl and attic access. Access Hatches and Doors: Access doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces) shall be weatherstripped and insulated to a level equivalent to the insulation on the surrounding surfaces. Access shall be provided to all equipment which prevents damaging or compressing the insulation. A wood framed or equivalent baffle or retainer must be provided when loose fill insulation is installed, the purpose of which is to prevent the loose fill insulation from spilling into the living space when the attic access is opened, and to provide a permanent means of maintaining the installed R-value of the loose fill insulation.	
SubTAG Recommendation	
Add WSEC language via amendment	
Consensus?	
Add as Section 402.2.11; cross reference in Chapter 8	

402.3 Fenestration.

402.3.1 U-factor. An area-weighted average of fenestration products shall be permitted to satisfy the *U-factor* requirements.

WSEC Ref	Differences
602.7.2	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IECC language	
Consensus?	
Keep IECC language	

402.3.2 Glazed fenestration SHGC. An area-weighted average of fenestration products more than 50 percent glazed shall be permitted to satisfy the SHGC requirements.

WSEC Ref	Differences
	Does not apply to Washington
Description of Differences	
Does not apply to residential occupancies per table 402.1	
SubTAG Recommendation	
Delete via amendment Keep IECC language?	
Consensus?	
Keep IECC language	

402.3.3 Glazed fenestration exemption. Up to 15 feet^2 (1.4 m2) of glazed fenestration per dwelling unit shall be permitted to be exempt from *U-factor* and SHGC requirements in Section 402.1.

WSEC Ref	Differences
602.7.2 Exception	Substantially the same
Description of Differences	
WSEC uses 1% of the floor area for the maximum amount of exempt glass. Better enforceability with the definitive size.	
SubTAG Recommendation	
Keep IECC language	
Consensus?	
Keep IECC language	

402.3.4 Opaque door exemption. One opaque door assembly is exempted from the *U-factor* requirement in Section 402.1.

WSEC Ref	Differences
502.1.5.2 Exception #3, 602.6 Exception #2	Different but can be easily changed
Description of Differences	
WSEC limits the maximum area of exempt opaque door area at 24 ft2	
SubTAG Recommendation	
Substitute WSEC language via amendment Keep IECC language	
Consensus?	
Substitute WSEC language via amendment	

402.3.5 Thermally isolated sunroom U-factor. For Zones 4 through 8, the maximum fenestration *U-factor* shall be 0.50 and the maximum skylight *U-factor* shall be 0.75. New windows and doors separating the sunroom from conditioned space shall meet the building thermal envelope requirements.

WSEC Ref	Differences
502.1.5 ex 2, 3	IECC only
Description of Differences	
WSEC does not reduce fenestration U-factors for sunrooms.	
SubTAG Recommendation	
Delete via amendment Substitute WSEC language via amendment	
Consensus?	
Substitute WSEC language via amendment	

402.3.6 Replacement fenestration. Where some or all of an existing fenestration unit is replaced with a new fenestration product, including ~~frame~~, sash and glazing, the replacement fenestration unit shall meet the applicable requirements for *U-factor* and SHGC in Table 402.1.[12]

WSEC Ref	Differences
101.3.2.5 Exception #1	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IECC language	
Consensus?	
Keep IECC language but watch what happens with the code change in October	

402.4 Air leakage.

402.4.1 Building thermal envelope. The building thermal envelope shall be durably sealed to limit infiltration. The sealing methods between dissimilar materials shall allow for differential expansion and contraction. The following shall be caulked, gasketed, weatherstripped or otherwise sealed with an air barrier material, suitable film or solid material.

1. All joints, seams and penetrations.
2. Site-built windows, doors and skylights.
3. Openings between window and door assemblies and their respective jambs and framing.
4. Utility penetrations.
5. Dropped ceilings or chases adjacent to the thermal envelope.
6. Knee walls.
7. Walls and ceilings separating a garage from conditioned spaces.
8. Behind tubs and showers on exterior walls.
9. Common walls between dwelling units.
10. Other sources of infiltration.

WSEC Ref	Differences
502.4	Substantially the same
Description of Differences	
IECC may be a little more comprehensive	
SubTAG Recommendation	
Keep IECC language	
Consensus?	
Keep IECC language	

402.4.2 Fenestration air leakage. Windows, skylights and sliding glass doors shall have an air infiltration rate of no more than 0.3 cfm/ft2 (1.5 Lls/m2), and swinging doors no more than 0.5 cfm/f2 (2.6 Lls/m2), when tested according to NFRC 400, ~~101/I.S.2, or 101/I.S.2/NAFS~~ or AAMA/WDMA/CSA 101/I.S.2/A440 by an accredited, independent laboratory and Listed and labeled by the manufacturer.[13]

Exceptions: Site-built windows, skylights and doors.

WSEC Ref	Differences
502.4.2	Substantially the same IECC only
Description of Differences	
WSEC does not reference any structural or air leakage standards—only thermal testing	
SubTAG Recommendation	
Keep IECC language Substitute WSEC language via amendment Substitute WSEC language via amendment; reference IRC 613? — Small business exemption needed?	
Consensus?	
No consensus reached, further research needed.	

402.4.3 Recessed lighting. Recessed luminaries installed in the building thermal envelope shall be sealed to limit air leakage between conditioned and unconditioned spaces by being:

1. IC-rated and labeled with enclosures that are sealed or gasketed to prevent air leakage to the ceiling cavity or unconditioned space; or
2. IC-rated and labeled as meeting ASTM E 283 when tested at 1.57 psi (75 Pa) pressure differential with no more than 2.0 cfm (0.944 L/s) of air movement from the conditioned space to the ceiling cavity; or
3. Located inside an airtight sealed box with clearances of at least 0.5 inch (12.7 mm) from combustible material and 3 inches (76 mm) from insulation.

WSEC Ref	Differences
502.4.4	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IECC language	
Consensus?	
Keep IECC language	

402.5 Moisture control. The building design shall

[12] EC30

[13] EC32

not create conditions of accelerated deterioration from moisture condensation. Above-grade frame walls, floors and ceilings not ventilated to allow moisture to escape shall be provided with an approved vapor retarder. The vapor retarder shall be installed on the warm-in-winter side of the thermal insulation.

Exceptions:

1. In construction where moisture or its freezing will not damage the materials.
2. Frame walls, floors and ceilings in jurisdictions in Zones 1 ~~through 4~~ , *2, 3, 4A, and 4B*. (Crawl space floor vapor retarders are not exempted.)
3. Where other approved means to avoid condensation are provided.[14]

WSEC Ref	Differences
502.1.6.1	Different but can be easily changed
Description of Differences	
WSEC contains specific vapor retarder requirements for various building assemblies. IECC does not require a ventilation space in ceilings and apparently does not require a ground cover in a crawl space. No requirement for a ground cover was found in IRC	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	
Substitute WSEC language via amendment	

402.5.1 Maximum fenestration U-factor and SHGC. The area weighted average maximum fenestration *U-factor* permitted using trade offs from Section 402.1.3 or Section 404 shall be 0.48 in Zones 4 and 5 and 0.40 in zones 6 through 8 ~~shall be 0.45~~ for vertical fenestration, and 0.75 in zones 4 through 8 for skylights. The area weighted average maximum fenestration SHGC permitted using trade-offs from Section 404 in Zones 1 through 3 shall be 0.50.[15]

WSEC Ref	Differences
	IECC only
Description of Differences	
WSEC does not limit trade offs	
SubTAG Recommendation	
Keep IECC language Delete via amendment	
Consensus?	
Delete via amendment	

[14] EC33
[15] EC37

SECTION 403
SYSTEMS

403.1 Controls. At least one thermostat shall be provided for each separate heating and cooling system.

WSEC Ref	Differences
503.8.1	Different but can be easily changed
Description of Differences	
WSEC specifically states temperature ranges for t-stats controlling heating or cooling. When the stat is used for both heating and cooling a 10o deadband is required.	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	
Keep IECC language but add WSEC language for deadband requirement via amendment	

403.1.1 Heat pump supplementary heat. Heat pumps having supplementary electric-resistance heat shall have controls that except during defrost, prevent supplemental heat operation when the heat pump compressor can meet the heating load.[16]

WSEC Ref	Differences
503.8.3.5	Different but can be easily changed
Description of Differences	
WSEC requires programmable t-stats for heat pumps.	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	
Substitute WSEC language via amendment	

403.2 Ducts.

403.2.1 Insulation. Supply and return ducts shall be insulated to a minimum of R-8. Ducts in floor trusses shall be insulated to a minimum of R-6.

WSEC Ref	Differences
503.9	Different but can be easily changed

[16] EC42

Description of Differences
WSEC does not reduce the required R-value for ducts in a floor truss. If this is adopted, additional language should be added allowing the reduction if required floor insulation is installed to the exterior of the duct.
SubTAG Recommendation
Substitute WSEC language via amendment Keep IECC language
Consensus?
Keep IECC language but delete R-6 allowance

Exception: Ducts or portions thereof located completely inside the building thermal envelope.

WSEC Ref	Differences
503.9 Exception #1	Substantially the same
Description of Differences	
WSEC has three additional exception for duct insulation	
SubTAG Recommendation	
Keep IECC language	
Consensus?	
Keep IECC language	

403.2.2 Sealing. All ducts, air handlers, filter boxes, and building cavities used as ducts shall be sealed. Joints and seams shall comply with Section M1601.3.1 of the *International Residential Code*.

WSEC Ref	Differences
503.10.2	Substantially the same
Description of Differences	
Longitudinal and transverse sealing in IECC WSEC has prohibition against unlisted tapes-IRC references listed tapes for listed products	
SubTAG Recommendation	
Keep IECC language Substitute WSEC language via amendment	
Consensus?	
Substitute WSEC language via amendment and recommend IRC reflect same language	

403.2.3 Building cavities. Building framing cavities shall not be used as supply ducts.

WSEC Ref	Differences
	IECC only
Description of Differences	
SubTAG Recommendation	
Keep IECC language	
Consensus?	
Keep IECC language (Consider addressing both supply and return air)	

403.3 Mechanical system piping insulation. Mechanical system piping capable of carrying fluids above 105°F (41°C) or below 55°F (13°C) shall be insulated to a minimum of R-2.

WSEC Ref	Differences
503.11, Table 5-12	Different but can be easily changed
Description of Differences	
WSEC requires R-3 pipe insulation	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	
Substitute WSEC language via amendment	

403.4 Circulating hot water systems. All circulating service hot water piping shall be insulated to at least R-2. Circulating hot water systems shall include an automatic or readily accessible manual switch that can turn off the hot water circulating pump when the system is not in use.

WSEC Ref	Differences
	IECC only
Description of Differences	
WSEC used to have language regarding insulation of pipes for circulating hot water systems. Keep IECC language but increase R-value to R-3	
SubTAG Recommendation	
Keep IECC language	
Consensus?	
Keep IECC language but increase to R-3 for consistency with current WSEC	

403.5 Non-circulating hot water systems. All noncirculating service water piping with vertical pipe risers shall have a heat trap on both the inlet and outlet of the water heater unless the water heater has an integral heat trap. Water heaters without integral heat traps shall have the outlet piping insulated to at least R-2 for the first 8 feet (2438 mm).[17]

WSEC Ref	Differences
	IECC only
Description of Differences	

[17] EC47

SubTAG Recommendation
Keep IECC language
Consensus?
Keep IECC language

403.5 Mechanical ventilation. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

WSEC Ref	Differences
WAVIAQ 302.2.3	Substantially the same
Description of Differences	
SubTAG Recommendation	
Keep IECC language Delete section via amendment	
Consensus?	
New language: Reference the VIAQ	

403.6 Equipment sizing. Heating and cooling equipment shall be sized in accordance with Section M 1401.3 of the *International Residential Code.*

WSEC Ref	Differences
503.2.2	Different but can be easily changed
Description of Differences	
IECC refers to IRC which refers to ACCA Manual J. Manual J is a heating load calculation but does not have system sizing requirements. WSEC has a prescriptive method.	
SubTAG Recommendation	
Substitute WSEC language via amendment	
Consensus?	
Substitute WSEC language via amendment	

TABLE 402.1
INSULATION AND FENESTRATION REQUIREMENTS BV COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
1	1.20	0.75	0.40	30	13	3	13	0	0	0
2	0.75	0.75	0.40	30	13	4	13	0	0	0
3	0.65	0.65	0.40[e]	30	13	5	19	0	0	5 / 13
4 except Marine	0.40	0.60	NR	38	13	5	19	10 / 13	10, 2ft	10 / 13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13	30[f]	10 / 13	10, 2 ft	10 / 13
6	0.35	0.60	NR	49	19 or 13+5[g]	15	30[f]	10 / 13	10, 4 ft	10 / 13
7 and 8	0.35	0.60	NR	49	21	19	30[f]	10 / 13	10, 4 ft	10 / 13

For SI: 1 foot = 304.8 mm.

a. R-values are minimums. *U-factors* and SHGC are maximums. R-19 shall be permitted to be compressed into a 2 x 6 cavity.
b. The fenestration *U-factor* column excludes skylights. The SHGC column applies to all glazed fenestration.
c. The first R-value applies to continuous insulation, the second to framing cavity insulation; either insulation meets the requirement.
d. R-5 shall be added to the required slab edge R-values for heated slabs.
e. There are no SHGC requirements in the Marine zone.
f. Or insulation sufficient to fill the framing cavity, R-19 minimum.
g "15+5" means R-15 cavity insulation plus R-5 insulated sheathing. "13+6" means R-13 cavity insulation plus R-6 insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, R-5 sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.[18]

[18] EC19

TABLE 402.1.2 EQUIVALENT U-FACTORS[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.75	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.65	0.65	0.035	0.082	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.059	0.065

a. Non-fenestration U-factors shall be obtained from measurement, calculation or an approved source.

TABLE 402.2.4
STEEL-FRAME CEILING, WALL AND FLOOR INSULATION (R-VALUE)

WOOD FRAME R-VALUE REQUIREMENT	COLD-FORMED STEEL EQUIVALENT R-VALUE[a]
Steel Truss Ceilings[b]	
R-30	R-38 or R-30+3 or R-26+5
R-38	R-49 or R-383
R-49	R-38+5
Steel Joist Ceilings[b]	
R-30	R-38 in 2x4 or 2x6 or 2x8 R-49 in any framing
R-38	R-49 in 2x4 or 2x6 or 2x8 or 2x10
Steel Framed Wall	
R-13	R-13+5 or R-15+4 or R-21+3
R-19	R-13+9 or R-19+8 or R-25+7
R-21	R-13+10 or R-19+9 or R-25+8
Steel Joist Floor	
R-13	R-19 in 2x6 R-19+6 in 2x8 or 2x10
R-19	R-19+6 in 2x6 R-19+12 in 2x8 or 2x10

a. Cavity insulation R-value is listed first, followed by continuous insulation R-value.
b. Insulation exceeding the height of the framing shall cover the framing.

Comparison of Okanogan, Ferry, Stevens and Pend Oreille Counties
IECC Climate Zone 6, WSEC Climate Zone 2

Shaded boxes are more stringent (all tables)

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
IECC 6	0.35	0.60	NR	49	19 or 13+5g	15	30f	10 / 13	10, 4 ft	10 / 13
WSEC 2*	0.40	0.58	NR**	38	21 Int. or 15+4 or 13 +5	***	30	12 / 21	10, 2 ft	***
WSEC 2****	0.35	0.58	NR**	38	21 Int. or 15+4 or 13 +5	***	30	12 / 21	12, 2 ft	***

* WSEC Reference case (15% path)
****WSEC Reference case (unlimited glazing) (R-3/R-4)
** Not required
*** No listing in WSEC

Comparison of Chelan, Douglas, Lincoln, Spokane, Kittitas, Grant, Adams, and Whitman Counties
IECC Climate Zone 5, WSEC Climate Zone 2

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
IECC 5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13	30[f]	10 / 13	10, 2 ft	10 / 13
WSEC 2*	0.40	0.58	NR**	38	21 Int. or 15+4 or 13 +5	***	30	12 / 21	10, 2 ft	***

* WSEC Reference case
** Not required
*** No listing in WSEC

Comparison of Skamania, Yakima, Klickitat, Benton, Franklin, Walla Walla, Columbia, Garfield, and Asotin Counties
IECC Climate Zone 5, WSEC Climate Zone 1

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
IECC 5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13	30[f]	10 / 13	10, 2 ft	10 / 13
WSEC 1*	0.40	0.58	NR**	38	21 or 15+4 or 13 +5	***	30	10 / 21	10, 2 ft	***

* WSEC Reference case
** Not required
*** No listing in WSEC

Comparison of Whatcom, Skagit, Snohomish, King, Pierce, Lewis, Cowlitz, Wahkiakum, Pacific, Grays Harbor, Thurston, Mason, Jefferson and Clallam Counties

IECC Climate Zone Marine 4, WSEC Climate Zone 1

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
IECC 5 and Marine 4	0.35	0.60	NR	38	19 or 13+5[g]	13	30[f]	10 / 13	10, 2 ft	10 / 13
WSEC 1*	0.40	0.58	NR**	38	21 or 15+4 or 13 +5	***	30	10 / 21	10, 2 ft	***

* WSEC Reference case
** Not required
*** No listing in WSEC

IECC Footnotes:

a. R-values are minimums. *U-factors* and SHGC are maximums. R-19 shall be permitted to be compressed into a 2 x 6 cavity.
b. The fenestration *U-factor* column excludes skylights. The SHGC column applies to all glazed fenestration.
c. The first R-value applies to continuous insulation, the second to framing cavity insulation; either insulation meets the requirement.
d. R-5 shall be added to the required slab edge R-values for heated slabs.
e. There are no SHGC requirements in the Marine zone.
f. Or insulation sufficient to fill the framing cavity, R-19 minimum.
g "15+5" means R-15 cavity insulation plus R-5 insulated sheathing. "13+6" means R-13 cavity insulation plus R-6 insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, R-5 sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.[19]

WSEC Ref	**Differences**
Description of Differences	
WSEC is more stringent for skylights, all walls, and floors. IECC is more stringent for glazing, ceilings, and slab edge insulation. IECC Footnote f under floors allows a reduction to R-19/fill cavity only, making WSEC more stringent WSEC has values for both attic and vault ceilings, allowing more flexibility WSEC provides more flexibility by providing more prescriptive paths Footnote g in IECC under walls allows a portion of the wall to remain uninsulated. WSEC has no crawlspace value	
SubTAG Recommendation	
Consensus?	
No consensus	

[19] EC19

TAG comments:

1. WSEC has more stringent requirements for skylights, walls, floors, and basement walls.
2. IECC has more stringent values for vertical glazing and in zone 6 ceilings
3. WSEC provides more flexibility in with more prescriptive paths.
4. Crawlspace perimeter insulation under IECC is substantially under the requirement in the WSEC.
5. Basement wall values in IECC are below the requirement of the WSEC.
6. The mass wall value in IECC provides a substantial decrease over the WSEC requirements.
7. IECC Footnote g under walls allows up to 25% of the wall to remain uninsulated.
8. IECC Footnote f. I believe that the prescriptive floor insulation should be installed or another compliance path should be used. Allowing the reduction to R-19 may be an incentive to build with 2x6 floor joists.
9. IECC Footnote d. WSEC currently requires that the entire slab be insulated if it is a heated slab. I don't see a great benefit by adding an additional R-5 to the slab edge. Keep current WSEC requirement.

This section is based on a piece of software that automatically generates an IECC complying reference building (e.g. RESCheck). Unless we adopt this code without amendment that program or any standard program built around IECC would need substantial revisions. Rather than pre- judge this issue the requirement was rewritten to allow the applicant to generate the reference building. This has the effect of forcing the applicant to generate a complying reference for comparison. To minimize the potential for gaming such a system a provision for the building official to reject such a building out of hand was added. Thus the burden of proof is on the applicant (along the line of the Oregon Code language).

This section is the purposed alterations to the residential performance compliance approach. The additions include extensive references to the VIAQ code for components of the ventilation and infiltration. The IECC uses an abbreviated reference standard that is meant to substitute for our more fully developed code.

Some language was added to make the development of the reference building simulation more consistent with the simulation language in the WSEC.

SECTION 404
SIMULATED PERFORMANCE ALTERNATIVE

404.1 Scope. This section establishes criteria for compliance using simulated energy performance analysis. Such analysis shall include heating, cooling, and service water heating energy only.

WSEC Ref	Differences
402.1.1	IECC only
Description of Differences	
The WSEC mentions only heating and DHW. No cooling is included. Adding cooling influences what tools might be used to demonstrate compliance. SUNDAY and WATTSUN never calculated a cooling load.	
SubTAG Recommendation	
Consensus?	
Keep IECC language	

404.2 Mandatory requirements. Compliance with this Section requires that the criteria of Sections 401,402.4, 402.5 and 403 be met.

404.3 Performance-based compliance. Compliance based on simulated energy performance requires that a proposed residence (proposed design) be shown to have an annual energy cost that is less than or equal to the annual energy cost of the standard reference design. Energy prices shall be taken from a source approved by the code official, such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report.* Code officials shall be permitted to require time-of-use pricing in energy cost calculations.

Exception: Jurisdictions that require site energy (1 kWh = 3,413 Btu) rather than energy cost as the metric of comparison.

WSEC Ref	Differences
402.1.2	IECC only
Description of Differences	
WSEC language requires energy use as a criteria not cost. The exception in the IECC provides this alternative.	
SubTAG Recommendation	
Keep IECC language in the exception but amend 404.3 to use that language.	
Consensus?	
Amend to use exception language as basis Policy Decision	

404.4 Documentation

404.4.1 Compliance software tools. Documentation verifying that the methods and accuracy of the compliance software tools conform to the provisions of this section shall be provided to the code official.

WSEC Ref	Differences
402.1.2	Substantially the same
Description of Differences	
IECC make the acceptance of the calculation tool the role of the Building Official WSEC gives a list of approved software. The list is a little out of date.	
SubTAG Recommendation	
Keep IECC language, but provide the Building Official some guidance on acceptable software.	
Consensus?	
Keep IECC language, but provide the Building Official some guidance on acceptable software	

404.4.2 Compliance report. Compliance software tools shall generate a report that documents that the proposed design has annual energy costs less than or equal to the annual energy costs of the standard reference design. The compliance documentation shall include the following information:

1. Address of the residence;
2. An inspection checklist documenting the building component characteristics of the proposed design as Listed in Table 404.5.2(1). The inspection checklist shall show the estimated annual energy cost for both the standard reference design and the proposed design;
3. Name of individual completing the compliance report;
4. Name and version of the compliance software tool.

WSEC Ref	Differences
402.1.6	Substantially the same
Description of Differences	
Both codes define compliance as the calculated load of the purposed building is less than or equal to the code building. The IECC uses the cost language and includes cooling	
SubTAG Recommendation	
Keep IECC language but amend to be energy based.	
Consensus?	
Keep IECC language but amend to be energy based	

404.4.3 Additional documentation. The code official shall be permitted to require the following documents:

1. Documentation of the building component characteristics of the standard reference design.
2. A certification signed by the builder providing the building component characteristics of the proposed design as given in Table 404.5.2(1).

WSEC Ref	Differences
402.6	IECC more specific
Description of Differences	
WSEC mandates a report but does not specify its specific contents and does not specify a checklist of alternative components used to demonstrate compliance in the simulation analysis. The documentation language in the IECC allows the code official to not request the documentation.	
SubTAG Recommendation	
Keep IECC language but make the documentation mandatory. Need to change the IECC language but not sure how	
Consensus?	
No consensus	

404.5 Calculation procedure.

404.5.1 General. Except as specified by this section, the standard reference design and proposed design shall be configured and analyzed using identical methods and techniques.

WSEC Ref	Differences
402.1.2	IECC only
Description of Differences	
WSEC implies that both buildings use the same analysis but it is not stated.	
SubTAG Recommendation	
Keep IECC language	
Consensus?	
Keep IECC language	

404.5.2 Residence specifications. The standard reference design and proposed design shall be configured and analyzed as specified by Table 404.5.2(1). Table 404.5.2(1) shall include by reference all notes contained in Table 402.1.

WSEC Ref	Differences
402.1.3	WSEC similar but not identical
Description of Differences	
WSEC is less detailed on components. It requires specific thermostat setpoints, and specific equipment efficiencies. IECC references the federal minimum standards. Several areas of inconsistency with WSEC and WSVIAQ codes should be resolved but the table format seems less confusing.	
SubTAG Recommendation	
Keep IECC format but amend with specific changes (see table 404.5.2 below)	
Consensus?	
Keep IECC format but amend with specific changes (see table 404.5.2 below)	

404.6 Calculation software tools.

404.6.1 Minimum capabilities. Calculation procedures used to comply with this section shall be software tools capable of calculating the annual energy consumption of all building elements that differ between the standard reference design and the proposed design and shall include the following capabilities:

1. Computer generation of the standard reference design using only the input for the proposed design. The calculation procedure shall not allow the user to directly modify the building component characteristics of the standard reference design.
2. Calculation of whole-building (as a single zone) sizing for the heating and cooling equipment in the standard reference design residence in accordance with Section M 140 1.3 of the *International Residential Code*.
3. Calculations that account for the effects of indoor and outdoor temperatures and part-load ratios on the performance of heating, ventilating and air conditioning equipment based on climate and equipment sizing.
4. Printed code official inspection checklist Listing each of the proposed design component characteristics from Table 404.5.2(1) determined by the analysis to provide compliance, along with their respective performance ratings (e.g. R-Value, U-factor, SHGC, HSPF, AFUE, SEER, EF, etc.).

WSEC Ref	Differences
402.4, 402.5	Some Differences
Description of Differences	
WSEC has specific language about climate tapes and building loads. These are areas that are fairly standard in most analysis tools. The IECC requires documentation of the alternatives used. The WSEC allows a wider variety of software since it does not insist on a specific code documentation format. It is not clear that the applicant can generate this outside of the program in the IECC. The tools listed in WSEC generally don't have this capability.	
SubTAG Recommendation	
Keep IECC language	
Consensus?	
Works for one and two family but needs work for highrise or multifamily for manual generation of checklist.	

404.6.2 ~~Approved tools~~. Specific approval.
The building official shall determine if the simulation submittal meet the standards of this section including Performance analysis tools used, the compliance documentation,
Performance analysis tools meeting the applicable sections of 404 shall be permitted to be approved.
Tools are permitted to be approved based on meeting a specified threshold for a jurisdiction, ~~such as an accredited home energy rating system (HERS) tool~~. The code official shall be permitted to approve tools for a specified application or limited scope.[20]

WSEC Ref	Differences
	IECC only
Description of Differences	
SubTAG Recommendation	
Amend IECC language as noted above	
Consensus?	
No consensus – but needs amendment to provide guidelines	

404.6.3 Input values. When calculations require input values not specified by Sections 402, 403 and 404, those input values shall be taken from an approved source.

WSEC Ref	Differences
	IECC only
Description of Differences	
SubTAG Recommendation	
Keep IECC language	
Consensus?	
Keep IECC language	

[20] EC55

TABLE 404.5.2(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

WSEC Ref	Differences
402.1.3, 402.1.4, 402.1.5, 402.1.6	IECC tables more complete and cover a wider variety of conditions
Description of Differences	
IECC uses this table to describe a wide range of conditions not really covered in the code. These tables include the specifics of the infiltration and duct leakage assumption and well as guidance on the equipment controls and calculations. Punitive for the use of skylights Sunroom has no parallel in WSEC Glazing does not meet WA statute Air leakage from VIAQ need to be the base case; IECC is less restrictive VIAQ has requirements for mechanical ventilation that cannot be traded off Internal gains in IECC has different philosophy (days vs hours), WSEC reduces total internal gains Duct distribution table not in WSEC	
SubTAG Recommendation	
Refine IECC language to be more consistent with WSEC and WSVIAQ	
Consensus?	

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Above-grade walls:	Type: mass wall if proposed wall is mass: otherwise wood frame	As proposed
	Gross area: same as proposed	As proposed
	U-Factor: from Table 402.1.2	As proposed
	Solar absorptance = 0.75	As Proposed
	Emittance = 0.90	As Proposed
Basement and crawlspace walls:	Type: same as proposed	As proposed
	Gross area: same as proposed	As proposed
	U-Factor: from Table 402.1.2 with insulation layer on interior side of wall	As proposed
Above-grade floors:	Type: wood frame	As proposed
	Gross area: same as proposed	As proposed
	U-Factor: from Table 402.1.2	As proposed
Ceilings:	Type: wood frame	As proposed
	Gross area: same as proposed	As proposed
	U-Factor: from Table 402.1.2	As proposed

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Roofs:	Type: composition shingle on wood sheathing Gross area: same as proposed Solar absorptance = 0.75 Emittance =0.90	As proposed As proposed As proposed As proposed
Attics:	Type: vented with aperture = 1 ft^2 per 300 ft^2 ceiling area	As proposed
Foundations:	Type: same as proposed	As proposed
Doors:	Area: 40 ft^2 Orientation: North U-Factor: same as fenestration from Table 402.1	As proposed As proposed As proposed
Glazing: [a]	~~Total area[b] = 18% of conditioned floor area~~ Total area [b]= (a.) The proposed glazing area; where the proposed glazing area is less than 18% of the conditioned floor area. (b.) 18% of the conditioned floor area; where proposed glazing area is 18% or more of conditioned floor area.[21] Orientation: equally distributed to four cardinal compass orientations (N,E,S & W) U-Factor: from Table 402.1.2 SHGC: from Table 402.1.2, except that for climates with no requirement (NR) SHGC = 0.~~40~~ 45 shall be used Interior shade fraction: Summer (all hours when cooling is required) = 0.70 Winter (all hours when heating is required) = 0.85 External shading: none	As proposed As proposed As proposed As proposed Same as standard reference design[c] As proposed
Skylights	None	As proposed
Thermally isolated sunroom	None	As proposed

[21] EC52

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Air exchange rate	Specific Leakage Area (SLA)[d] = ~~0.00048~~ 0.00036 assuming no energy recovery[22]	For residences that are not tested, the same as the standard reference design For residences without mechanical ventilation that are tested in accordance with ASHRAE 119, Section 5.1, the measured air exchange rate[e] but not less than 0.35 ACH For residences with mechanical ventilation that are tested in accordance with ASHRAE 119, Section 5.1, the measured air exchange rate[e] combined with the mechanical ventilation rate[f], which shall not be less than 0.01 x CFA +7.5 x (N_{br}+1) Where: CFA = conditioned floor area N_{br} = number of bedrooms
Mechanical ventilation:	None, except where mechanical ventilation is specified by the proposed design, in which case: Annual vent fan energy use: kWh/yr = 0.03942 x CFA + 29.565 x (N_{br}+1) Where: CFA = conditioned floor area N_{br} = number of bedrooms	As proposed
Internals gains:	IGain = 17,900 + 23.8 x CFA + 4104 x N_{br} (Btu/day per dwelling unit)	Same as standard reference design
Internal mass:	An internal mass for furniture and contents of 8 pounds per square foot of floor area	Same as standard reference design, plus any additional mass specifically designed as a thermal storage element[g] but not integral to the building envelope or structure
Structural mass	For masonry floor slabs, 80% of floor area covered by R-2 carpet and pad, and 20% of floor directly exposed to room air; For masonry basement walls, as proposed, but with insulation required by Table 402.1.2 located on the interior side of the walls; For other walls, for ceilings, floors, and interior walls, wood frame construction.	As proposed As proposed As proposed
Heating systems[h,i]	Fuel type: Same as proposed design Efficiencies: Electric: air-source heat pump with prevailing federal minimum efficiency Nonelectric furnaces: natural gas furnace with prevailing federal minimum efficiency Nonelectric boilers: natural gas boiler with prevailing federal minimum efficiency Capacity: sized in accordance with Section	As proposed As proposed As proposed As proposed As proposed

[22] EC49

	M1401.3 of the International Residential Code	
Cooling systems[h,j]	Fuel type: electric Efficiency: in accordance with prevailing federal minimum efficiency standards Capacity: sized in accordance with Section M1401.3 of the International Residential Code	As proposed As proposed As proposed
Service water heating[h,k]	Fuel type: same as proposed design Efficiency: in accordance with prevailing federal minimum efficiency standards Use: gal/day = 30 + 10 x N_{br} Tank temperature: 120°F	As proposed As proposed Same as standard reference Same as standard reference
Thermal distribution systems:	A thermal distribution system efficiency (DSE) or 0.80 shall be applied to both the heating and cooling system efficiencies	Same as standard reference design, except as specified by Table 404.5.2(2)
Thermostat	Type: manual, cooling temperature set point = 78°F; heating temperature set point = 68°F	Same as standard reference design

For SI: 1 square foot = 0.93 m^2; 1 British thermal unit = 1055J; 1 pound per square foot = 4.88 kg/m^2; 1 gallon (U.S.) = 3.785 L; °C =(°F-32)/1.8.

a. Glazing shall be defined as sunlight-transmitting fenestration, including the area of sash, curbing or other framing elements, that enclose conditioned space. Glazing includes the area of sunlight-transmitting fenestration assemblies in walls bounding conditioned basements. For doors where the sunlight-transmitting opening is less than 50% of the door area, the glazing area is the sunlight transmitting opening area. For all other doors, the glazing area is the rough frame opening area for the door including the door and the frame.

b. For residences with conditioned basements, R-2 and R-4 residences and townhouses, the following formula shall be used to determine glazing area:

AF = 0.18 x *AFL* x *FAx* F

where:

AF = Total glazing area

~~*AFL* = Total floor area of directly conditioned space~~

A = *Standard Reference Design total Glazing Area*[23]

FA = (Above-grade thermal boundary gross wall area)/(above-grade boundary wall area + 0.5 x below-grade boundary wall area).

F = (Above-grade thermal boundary wall area)/(above-grade thermal boundary wall area + common wall area) or 0.56, whichever is greater.

and where:

Thermal boundary wall is any wall that separates conditioned space from unconditioned space or ambient conditions.

Above-grade thermal boundary wall is any thermal boundary wall component not in contact with soil.

Below-grade boundary wall is any thermal boundary wall in soil contact.

Common wall area is the area of walls shared with an adjoining dwelling unit.

c. For fenestrations facing within 15 degrees of true south that are directly coupled to thermal storage mass, the winter interior shade fraction shall be permitted to be increased to 0.95 in the proposed design.

d. Where Leakage Area *(L)* is defined in accordance with Section 5.1 of ASH RAE Standard 119 and where:

SLA = *L/CFA*

where *Land CFA* are in the same units.

e. Tested envelope leakage shall be determined and documented by an independent party approved by the code official. Hourly calculations as specified in the 2001 ASHRAE *Handbook* of *Fundamentals,* Chapter 26, page 26.21, equation 40 (Sherman-Grimsrud model) or the equivalent shall be used to determine the energy loads resulting from infiltration.

f. The combined air exchange rate for infiltration and mechanical ventilation shall be determined in accordance with equation 43 of 2001 ASHRAE *Handbook* of *Fundamentals* page 26.24 and the" Whole-house Ventilation" provisions of 2001 ASH RAE *Handbook* of *Fundamentals,* page 26.19 for intermittent mechanical ventilation.

[23] EC52

g. Thermal Storage Element shall mean a component not part of the floors, walls or ceilings that is part of a passive solar system, and that provides thermal storage such as enclosed water columns, rock beds, or phase-change containers. A thermal storage element must be in the same room as fenestration that faces within 15 degrees of true south, or must be connected to such a room with pipes or ducts that allow the element to be actively charged.

h. For a proposed design with multiple heating, cooling or water heating systems using different fuel types, the applicable standard reference design system capacities and fuel types shall be weighted in accordance with their respective loads as calculated by accepted engineering practice for each equipment and fuel type present.

i. For a proposed design without a proposed heating system, a heating system with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and proposed design. For electric heating systems, the prevailing federal minimum efficiency air-source heat pump shall be used for the standard reference design.

j. For a proposed design home without a proposed cooling system, an electric air conditioner with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and the proposed design.

k. For a proposed design with a nonstorage-type water heater, a 40-gallon storage-type water heater with the prevailing Federal minimum Energy Factor for the same fuel as the predominant heating fuel type shall be assumed. For the case of a proposed design without a proposed water heater, a 40-gallon storage-type water heater with the prevailing federal minimum efficiency for the same fuel as the predominant heating fuel type shall be assumed for both the proposed design and standard reference design.

TABLE 404.5.2(2)
DEFAULT DISTRIBUTION SYSTEM EFFICIENCIES FOR PROPOSED DESIGNS.

DISTRIBUTION SYSTEM CONFIGURATION AND CONDITION:	FORCED AIR SYSTEMS	HYDRONIC SYSTEMS[b]
Distribution system components located in unconditioned space	0.80	0.95
Distribution systems entirely located in conditioned space[c]	0.88	1.00
Proposed "reduced leakage" with entire air distribution system located in the conditioned spaced	0.96	--
Proposed "reduced leakage" air distribution system with components located in the unconditioned space[d]	0.88	--
"Ductless" systems.	1.00	--

For SI: 1 cubic foot per minute = 0.47 *Us;* 1 square foot = 0.093 m2; 1 pound per square inch = 6895 Pa; 1 inch water gauge = 1250 Pa.

a. Default values given by this table are for untested distribution systems, which must still meet minimum requirements for duct system insulation.

b. Hydronic Systems shall mean those systems that distribute heating and cooling energy directly to individual spaces using liquids pumped through closed loop piping and that do not depend on ducted, forced air flows to maintain space temperatures.

c. Entire system in conditioned space shall mean that no component of the distribution system, including the air handler unit, is located outside of the conditioned space.

d. Proposed "reduced leakage" shall mean leakage to outdoors not greater than 3 cfm per 100 ft^2 of conditioned floor area and total leakage not greater than 9 cfm per 100 ft^2 of conditioned floor area at a pressure differential of 25 Pascal across the entire system, including the manufacturer's air handler enclosure. Total leakage of not greater than 3 cfm per 100 ft^2 of conditioned floor area at a pressure difference of 25 Pascals across the entire system, including the manufacturer's air handler enclosure, shall be deemed to meet this requirement without measurement of leakage to outdoors. This performance shall be specified as required in the construction documents and confirmed through field-testing of installed systems as documented by an approved independent party.

e. Ductless systems may have forced airflow across a coil but shall not have any ducted airflows external to the manufacturer's air handler enclosure.